

Tuberculosis Surveillance Report

Arizona, 2006

**Arizona Department of Health Services
Bureau of Epidemiology and Disease Control
Office of Infectious Disease Services
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**Tuberculosis Control Program
150 North 18th Avenue, Suite 140
Phoenix, Arizona 85007
(602) 364-4750**



I. Purpose of the Report

The Tuberculosis Annual Surveillance Report is designed to be a source of data regarding tuberculosis (TB) in Arizona for purposes of prevention and control of the disease through interventions, new or changes in policies, rules and statutes, allocation of funds and planning services. The target audience includes government agencies, health care organizations and providers and other interested parties or individuals. The program can provide more detailed information upon request.

II. TB Surveillance, Prevention, and Control in Arizona

The Arizona Department of Health Services (ADHS) Tuberculosis Control Program (TBCP) is assigned the responsibility of monitoring, controlling and preventing infection, disease, and death associated with TB statewide through surveillance, data analyses, health education, dissemination of guidelines, consultation, and rule making. Tracking TB disease, completion of therapy, and drug susceptibility results of new TB cases are at the heart of the work of the TBCP. Other critical functions include monitoring the contacts of cases with active TB. To that end, the program maintains registries to monitor: (1) the occurrence, distribution, characteristics (risk factors), and trends of TB morbidity; (2) completion of therapy; (3) TB drug-resistance patterns; and (4) the follow-up of persons exposed to active TB cases to ensure absence of latent TB infection (LTBI) or medical evaluation and completion of preventive therapy if positive for LTBI.

The TBCP assesses the burden of disease/infection and the characteristics, distribution and the risk factors associated with disease. The local health departments (county and tribal) and the Indian Health Service units provide the direct patient care (tests, medical evaluation, therapy, and contact investigations). Local health departments also coordinate with private and other public providers (e.g., correctional health) who provide these services to patients with active TB disease or LTBI.

The Arizona State Public Health Laboratory provides testing services including acid-fast bacillus (AFB) smear, culture, identification, and drug susceptibility testing for clinical mycobacterial samples statewide and serves as a reference laboratory for all isolates suspected to be positive for TB. The State Laboratory also performs drug susceptibility testing on all first time positive isolates.

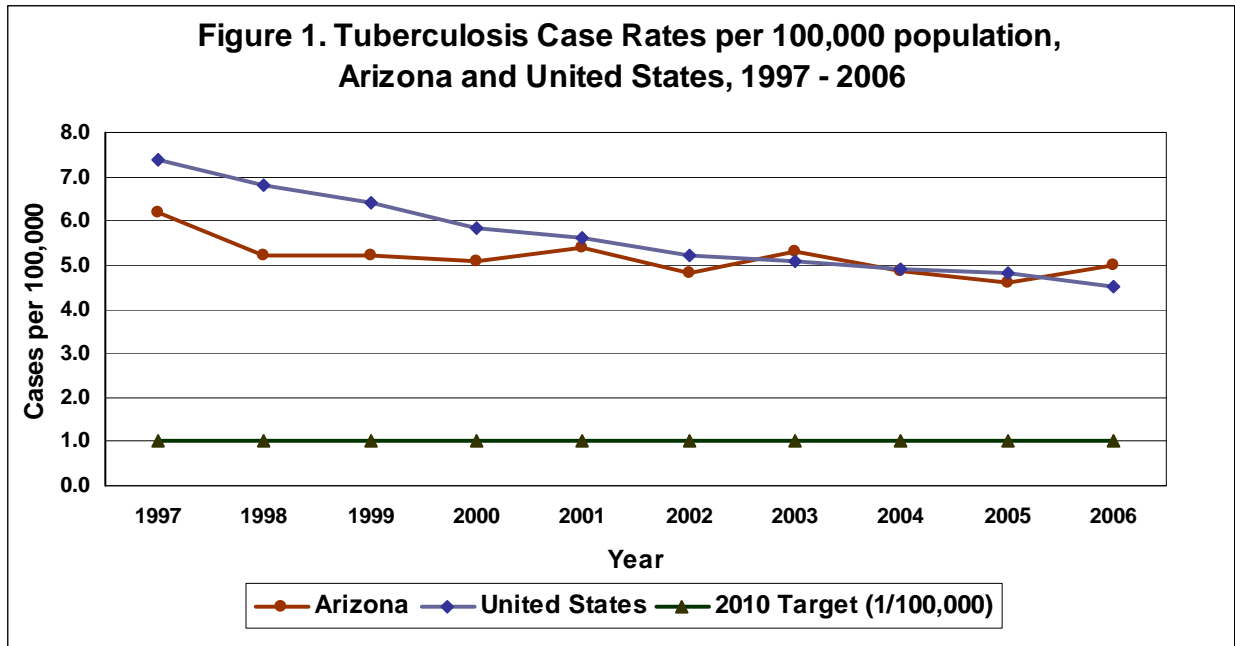
We acknowledge with gratitude the efforts of all public and private providers (clinicians and laboratorians) who make this report possible via their consistent and timely reporting of disease and drug susceptibility results.

III. Demographics

A. Incidence of TB

Arizona reported 315 cases of active tuberculosis (TB) in 2006, ranking 11th among reporting states in the U.S. This reflects a 12% increase from the previous year. While the U.S. has seen a 34 % decline in the number of TB cases for the past 10 years (1997-2006), Arizona has documented a relatively stable number of cases with a mean of 279 cases and a range between 254 and 315 cases in the ten year period. (Table 1 and Figure 1). However, due to significant population growth in the past 10 years, TB rates in Arizona have decreased from 6.2 cases per 100,000 population in 1997 to 5.0 in 2006.

Table 1. Tuberculosis Cases and Case Rates per 100,000 Population, Arizona and United States, 1997-2006					
	Arizona			United States^a	
Year	Cases	Population^{b,c}	Rate	Cases	Rate
1997	296	4,736,990	6.2	19,851	7.4
1998	254	4,883,342	5.2	18,361	6.8
1999	262	5,023,823	5.2	17,531	6.4
2000	261	5,130,632	5.1	16,377	5.8
2001	289	5,306,966	5.4	15,989	5.6
2002	263	5,456,453	4.8	15,078	5.2
2003	295	5,580,811	5.3	14,871	5.1
2004	272	5,580,811	4.9	14,511	4.9
2005	281	6,044,985	4.6	14,093	4.8
2006	315	6,239,482	5.0	13,767	4.6
^a Data from U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, available at: http://www.cdc.gov/tb/surv/ ^b Population denominators for 1995-2003 are estimates from the National Center for Health Statistics (http://www.cdc.gov/nchs/about/major/dvs/popbridge/popbridge.htm), with the exception of year 2000, which was taken from the 2000 U.S. Census ^c Population denominators for 2004 - 2006 are estimates provided by the Arizona Department of Economic Security					

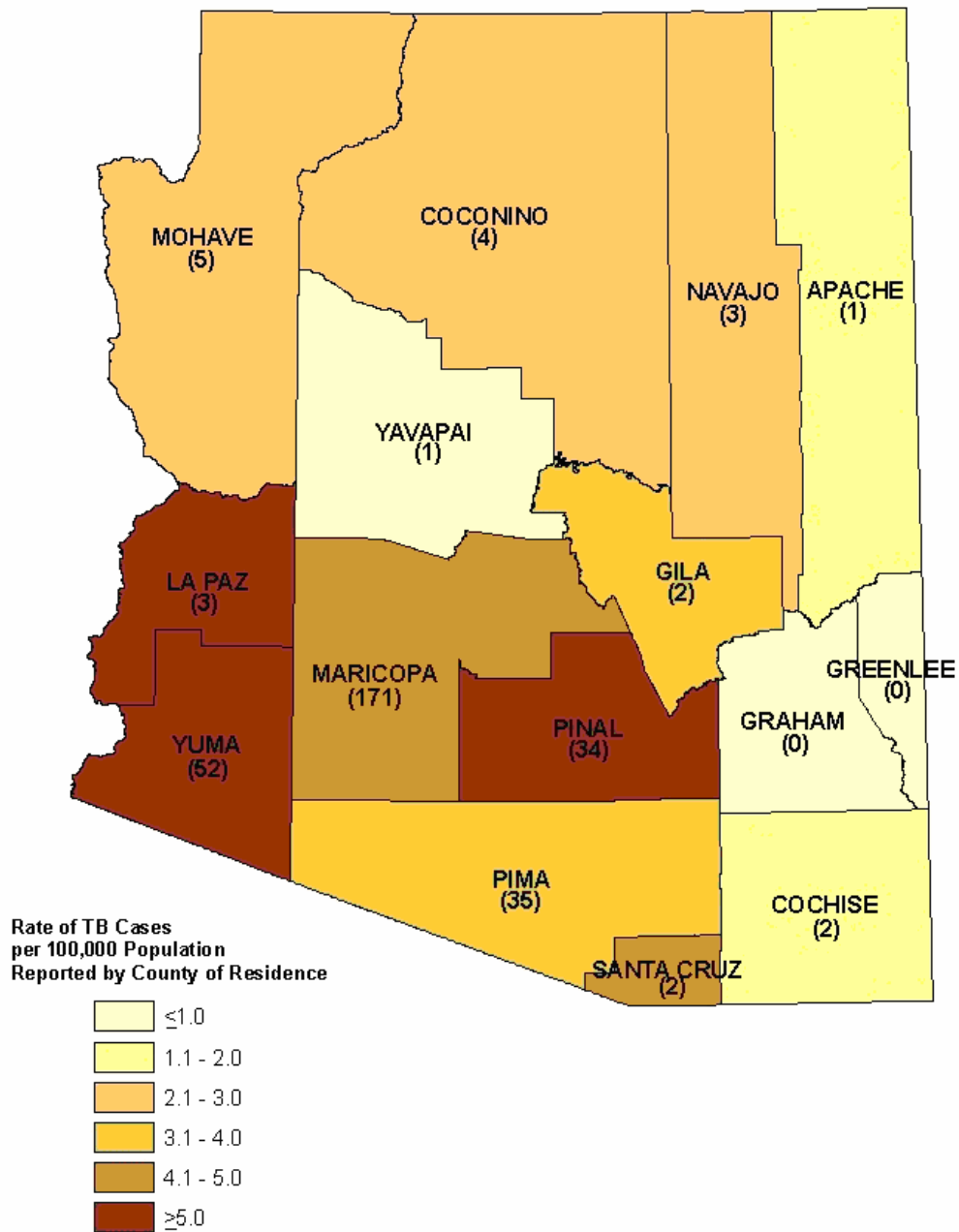


B. Location

Four of Arizona's 15 counties accounted for 93% of the state's TB cases (Figure 2). Maricopa County, which includes Phoenix, the fifth largest U.S city, led the state with 171 cases (54%). Pima County, a U.S.-Mexico border county that includes Tucson, Arizona's second largest urban area, had 35 cases (11%). Yuma County, the border county on the western side of Arizona had 52 cases (17%). Pinal County, which contains Arizona's two largest state prison facilities, four private prisons, Immigration and Customs Enforcement Service Processing Center (ICE-SPC), and a county jail, had 34 cases (11%). Correctional facilities in Pinal County diagnosed 26 of the 38 (69%) cases diagnosed in a correctional facility. There were no TB cases reported in Greenlee and Graham Counties in 2006, and the former has not reported a TB case in six years.

Figure 2 depicts the number of TB cases and case rates by county in 2006. While Maricopa County has the highest number of TB cases, the TB case rate is lower (4.5 case per 100,000 population), based on the large population in the jurisdiction. La Paz County has the highest TB case rate of 14 cases per 100,000 population, but has only 3 cases and a small population of 19,517. Yuma and Pinal Counties have high TB case rates as well and each has a substantial number of cases and population size.

**Figure 2. Tuberculosis Cases and Case Rates
per 100,000 Population, Arizona 2006**



C. Age/Gender/Race/Ethnicity

The majority of TB cases (60%) in Arizona in 2006 were in the 25 to 64 year old age groups with a mean and median age of 41.6 and 40 years, respectively (Figure 3). Of great concern is the percentage of cases among persons under the age of 25 (23%). There were also a significant number of cases in individuals over the age of 65. This group comprised 17% of the total cases. Males accounted for 67% of cases (n=211). The breakdown by race/ethnicity was 62% Hispanic; 17.8% White, non-Hispanic; 7.3% Black, non-Hispanic; 9.5% Asian; and 3.5% Native American. The highest TB case rate occurred in Asians with 18.5 cases per 100,000 (n=30) (Figure 4). However, the Asian population in Arizona is small, which translates to a high rate but small number of cases. The TB case rate for Hispanics was 11.5 cases per 100,000 (n=195) (Table 2).

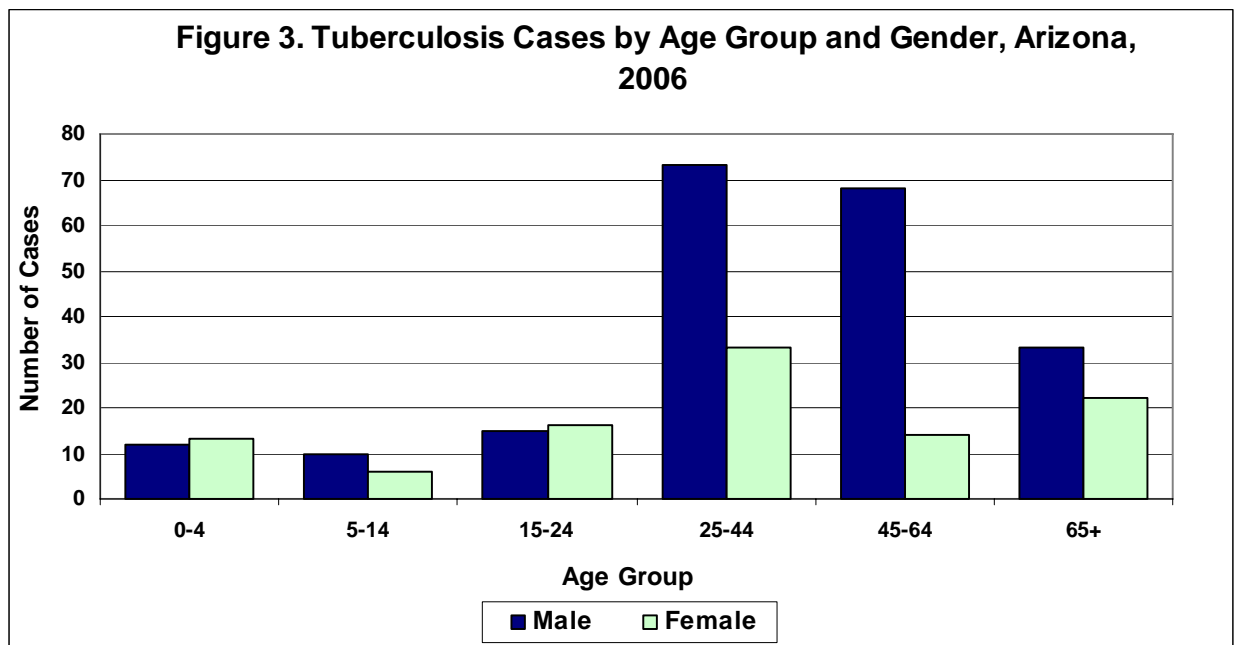


Figure 4. TB Case Rates by Race/Ethnicity, Arizona, 2006

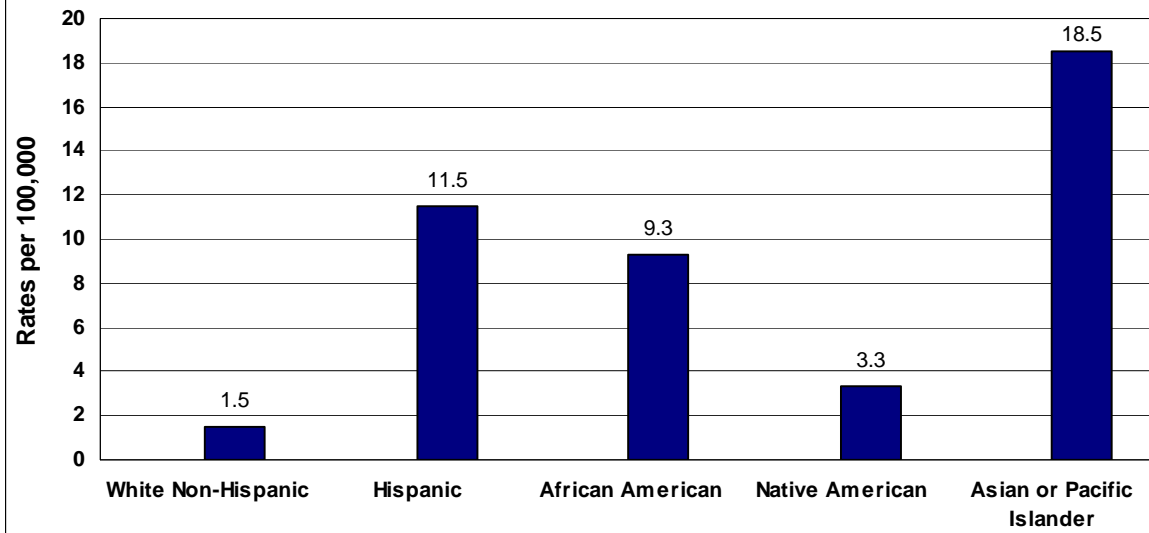


Table 2. Tuberculosis Cases by Ethnicity, Gender and Age Group, Arizona, 2006

	Age Group						Total by Ethnicity		
	< 5	5-14	15-24	25-44	45-64	65+	No.	(%)	Rate ^{a,b}
American Indian^c									
Male	0	0	0	2	2	3	7		
Female	0	0	0	1	2	1	4		
Total	0	0	0	3	4	4	11	(3.5)	3.3
Asian									
Male	0	1	3	5	7	2	18		
Female	0	1	2	4	5	0	12		
Total	0	2	5	9	12	2	30	(9.5)	18.5
Black, Not Hispanic									
Male	0	2	0	5	5	1	13		
Female	2	0	1	7	0	0	10		
Total	2	2	1	12	5	1	23	(7.3)	9.3
Hispanic or Latino									
Male	12	7	10	55	35	13	132		
Female	11	5	13	18	6	10	63		
Total	23	12	23	73	41	23	195	(62.0)	11.5
Native Hawaiian^c									
Male	0	0	0	0	0	0	0		
Female	0	0	0	0	0	0	0		
Total	0	0	0	0	0	0	0	(0.0)	0
White, Not Hispanic									
Male	0	0	2	6	19	14	41		
Female	0	0	0	3	1	11	15		
Total	0	0	2	9	20	25	56	(17.8)	1.5
More than one race									
Male	0	0	0	0	0	0	0		
Female	0	0	0	0	0	0	0		
Total	0	0	0	0	0	0	0	(0.0)	0.0
Total by Gender									
Male	12	10	15	73	68	33	211	(67.0)	6.8
Female	13	6	16	33	14	22	104	(33.0)	3.3
Total by Age Group									
No.	25	16	31	106	82	55	315		
(%)	(7.9)	(5.1)	(9.8)	(33.7)	(26.0)	(17.5)			
Rate ^{a,b}	5.2	1.8	3.5	6.0	5.8	6.9			5.0

^aRate per 100,000 population

^bPopulation denominators for 2006 are estimates provided by the Arizona Department of Economic Security

^cIncludes Pacific Islanders

D. TB in Children <5 Years of Age

Active TB in young children is indicative of ongoing transmission in the community and, more importantly, of missed opportunities for preventive therapy. This group accounted for 25 (7.9%) of all cases. Children <5 years of age had a case rate of 5.2 cases per 100,000 compared to the overall rate of 5.0 cases per 100,000 in Arizona. Nationwide, children <5 years of age had a rate of 2.4 cases per 100,000 and comprised 3.4% of overall cases in 2005, the most recent year for which data is available. Additionally, 92% of pediatric (<5 years of age) TB cases in 2006 occurred among Hispanics in Arizona (Table 2). Of the 25 pediatric cases, 22 were born in the United States and 3 were foreign born. Mexico was the country of origin for two of the three foreign born pediatric cases.

E. Site of Infection

Pulmonary TB with no additional site of disease accounted for 254 (81%) of all cases in 2006 (Table 3). Extrapulmonary disease accounted for 39 (12%) of all cases. Both pulmonary and extrapulmonary disease accounted for 22 (7%) of all cases.

Table 3. Tuberculosis Cases by Form of Disease and Vital Status at Diagnosis, Arizona, 2006						
Form of Disease	Alive at Diagnosis		Diagnosis After Death		Total Cases	
	No.	(%)	No.	(%)	No.	(%)
Pulmonary ^a	249	(98.0)	5	(2.0)	254	(100.0)
Extrapulmonary ^b	37	(94.9)	2	(5.1)	39	(100.0)
Persons with Both Pulmonary and Extrapulmonary Disease ^c	22	(100.0)	0	(0.0)	22	(100.0)
Total (%)	308	(97.8)	7	(2.2)	315	(100.0)
^a Includes cases with pulmonary listed as major site of disease and no additional site of disease						
^b Includes cases with pleural, lymphatic, bone and/or joint, meningeal, peritoneal, or other site, excluding pulmonary, listed as the major site of disease						
^c Includes miliary cases						

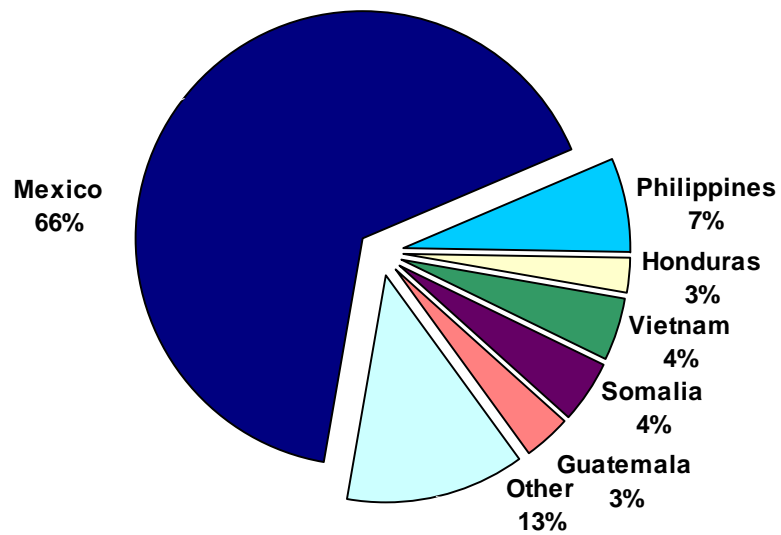
IV. Risk Factors

A. Foreign-Born Cases

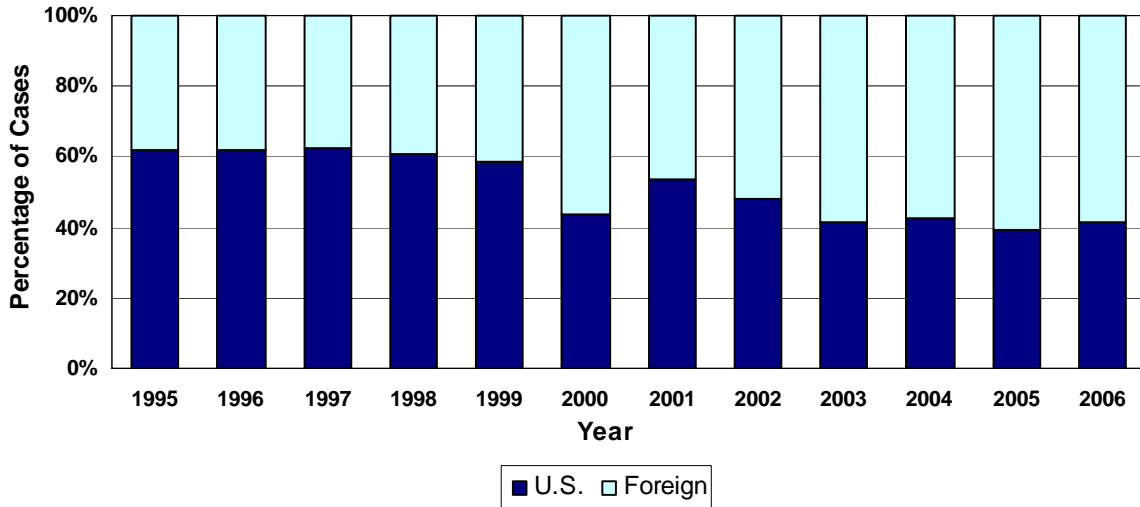
Table 4 indicates that the single most important risk factor (among those widely used nationwide) associated with TB was being foreign born (57% of all cases). Sixty eight percent of foreign born cases were from Mexico (Figure 5). Over the last ten years there has been an increasing trend in the percentage of foreign born individuals in relation to overall number of cases in Arizona (Figures 6 and 7).

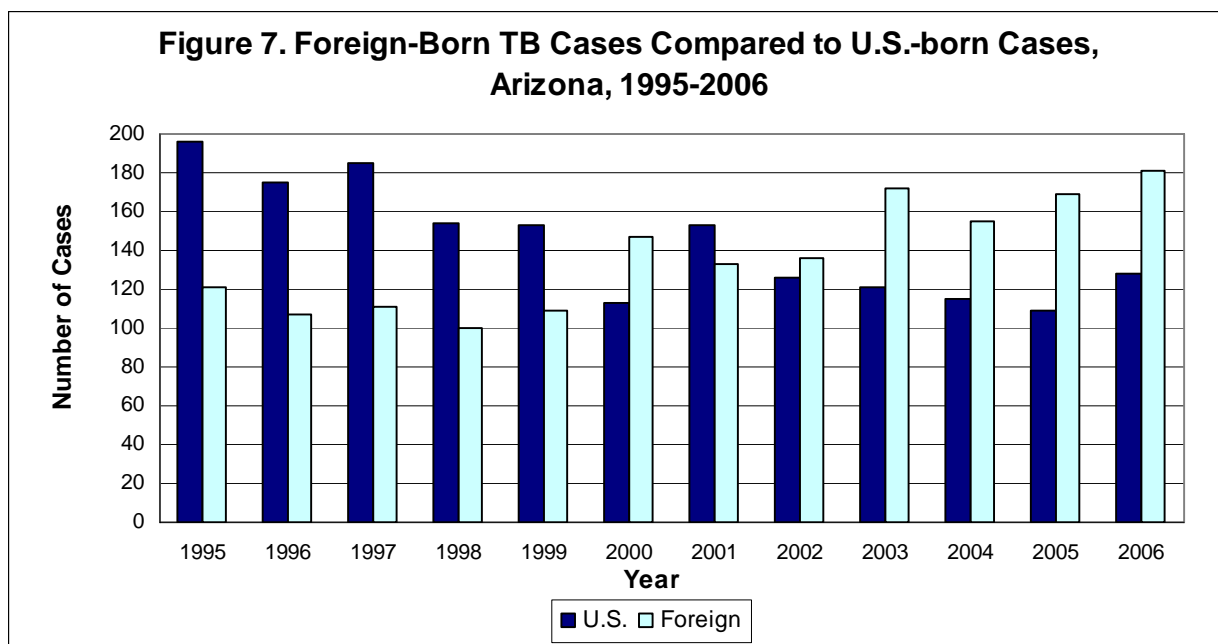
Table 4. Tuberculosis Cases by Selected Risk Factors, Arizona, 2000-2006														
	2000		2001		2002		2003		2004		2005		2006	
	Cases	(%)	Cases	(%)	Cases	(%)	Cases	(%)	Cases	(%)	Cases	(%)	Cases	(%)
Occupation														
Correctional Facility Worker	0	(0.0)	0	(0.0)	0	(0.0)	0	(0.0)	0	(0.0)	0	(0.0)	2	(0.6)
Health Care Worker	6	(2.3)	5	(1.7)	3	(1.1)	3	(1.0)	6	(2.2)	1	(0.4)	9	(2.9)
Migrant Farm Worker	9	(3.4)	6	(2.1)	8	(3.0)	4	(1.4)	10	(3.7)	5	(1.8)	11	(3.5)
Reported Behaviors														
Injecting Drug Use ^a	11	(4.2)	11	(3.8)	10	(3.8)	5	(1.7)	7	(2.6)	11	(3.9)	7	(2.2)
Non-injecting Drug Use ^a	20	(7.7)	22	(7.6)	27	(10.3)	24	(8.1)	31	(11.4)	20	(7.1)	17	(5.4)
Excess Alcohol Use ^a	46	(17.6)	61	(21.1)	41	(15.6)	57	(19.3)	48	(17.6)	29	(10.3)	38	(12.1)
Type of Residence														
Long Term Care Facility ^b	7	(2.7)	12	(4.2)	7	(2.7)	5	(1.7)	10	(3.7)	7	(2.5)	10	(3.2)
Correctional Facility ^e	21	(8.0)	16	(5.5)	19	(7.2)	39	(13.2)	36	(13.2)	40	(16.4)	38	(14)
Homeless ^a	39	(14.9)	45	(15.6)	32	(12.2)	36	(12.2)	21	(7.7)	23	(8.2)	29	(9.2)
Country of Birth														
Foreign Born ^c	147	(56.3)	134	(46.4)	137	(52.1)	172	(58.3)	156	(57.4)	170	(60.5)	181	(58)
Underlying Disease														
HIV infection, All Ages ^d	18	(6.9)	12	(4.2)	18	(6.8)	17	(5.8)	23	(8.5)	20	(7.1)	15	(4.8)
HIV infection, 25-44 Years Old ^d	13	(5.0)	8	(2.8)	12	(4.6)	13	(4.4)	19	(7.0)	12	(4.3)	9	(8.5)
Total Cases	261		289		263		295		272		281		315	
^a Within one year prior to diagnosis of tuberculosis ^b Residence at time of diagnosis ^c Includes persons born outside the United States and its territories ^d Tuberculosis cases with a reported positive HIV test result; the percent positive represents HIV co-infection among all verified TB cases, including those not tested for HIV infection														

**Figure 5. Country of Origin for Foreign-born TB Cases
Arizona, 2006**



**Figure 6. Percentage of TB Cases Occurring in Foreign-Born
Persons, Arizona, 1995 - 2006**

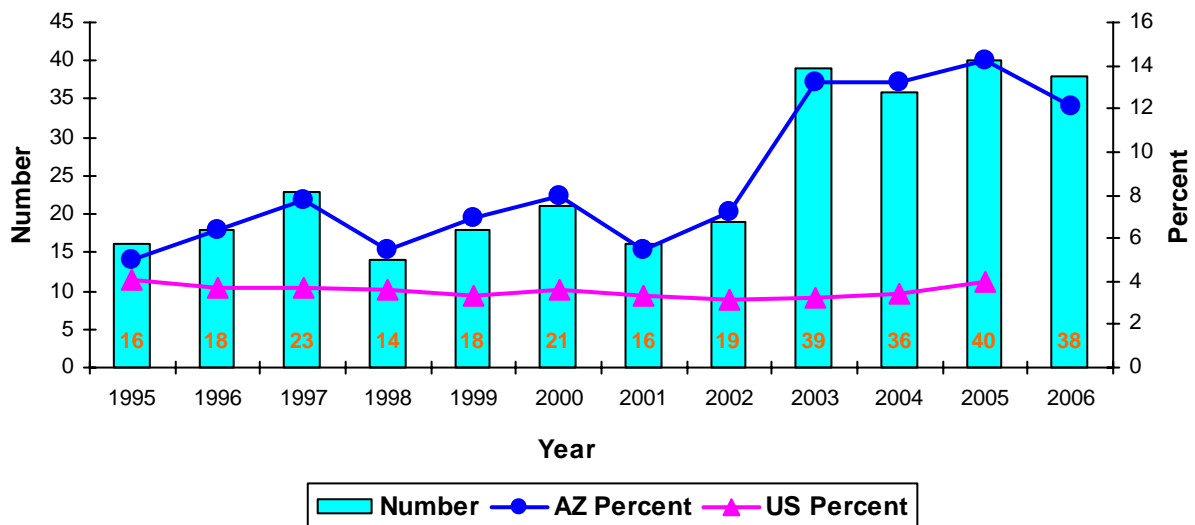




B. Correctional Facilities and Related Risk Factors

Individuals at high risk of exposure to TB are those in correctional facilities, those with a history of drug/alcohol abuse and those with a history of homelessness (Table 4). Arizona had one of the highest percentages (12.1%) of cases diagnosed in correctional facilities nationally in 2006 (Figure 8). Routine evaluation for TB of all inmates during intake allows for diagnosis of both latent and active infection in this population. Eighty-nine percent (34/38 cases) of the correctional TB cases were foreign born with Mexico being reported as the country of origin in 58% (22/38 cases). Ninety five percent (36/38 cases) of the correctional TB cases were Hispanic in race while one was Asian and one was Caucasian. Inmate TB screening requirements in correctional facilities were implemented in 2004 to address the problem of tuberculosis in this setting. Additionally, the TB program has been working closely with correctional health staff on TB education and regulation implementation.

Figure 8. Number and Percent of TB Cases Diagnosed in Correctional Facilities, Arizona and the U.S., 1995-2006



C. TB/HIV

Co-infection with HIV in individuals with TB is a major concern due to the fact that immune system suppression by HIV can impact the body's ability to fight TB. Individuals with co-infection have higher mortality and are susceptible to increased drug resistance leading to longer and more complex treatment regimens. HIV testing results were available for 207 of 274 (76%) TB cases 14 years of age and older in 2006 (Table 5). Of these, 15 (5.5%) cases of active TB had documented HIV co-infection. Nine of the 15 (60%) cases were between the ages 25 and 44 reflecting 8.5% of cases in this age group. Additionally 2 cases of co-infection occurred in individuals in correctional facilities.

Table 5. Proportion of Reported Tuberculosis Cases with HIV Test Results and HIV Co-infection by Age Group, U.S. and Arizona, 1995-2006

Year	25-44 Years Old				14 Years and Older			
	HIV Test Results Known ^a		HIV Positive ^b		HIV Test Results Known ^a		HIV Positive ^b	
	U.S.	AZ	U.S.	AZ	U.S.	AZ	U.S.	AZ
	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)
1995	(52)	(53)	(26)	(19)	(36)	(33)	(13)	(8)
1996	(57)	(65)	(25)	(13)	(41)	(44)	(12)	(5)
1997	(60)	(69)	(21)	(10)	(44)	(45)	(11)	(4)
1998	(61)	(77)	(20)	(16)	(45)	(47)	(10)	(6)
1999	(63)	(84)	(19)	(10)	(48)	(60)	(10)	(6)
2000	(63)	(74)	(17)	(14)	(50)	(63)	(9)	(7)
2001	(63)	(82)	(16)	(9)	(50)	(66)	(9)	(4)
2002	(65)	(85)	(16)	(14)	(53)	(61)	(9)	(7)
2003	(67)	(93)	(16)	(15)	(55)	(71)	(9)	(6)
2004	(67)	(89)	(14)	(18)	(56)	(79)	(8)	(8)
2005	(65)	(84)	*	(13)		(83)	*	(7)
2006	*	(85)	*	(9)	*	(76)	*	(6)

^aIncludes cases with positive, negative and indeterminate HIV test results. Rhode Island reported HIV test results 1998-2001; California reporting of HIV status is incomplete and only includes persons also reported with AIDS

^bBased on reported HIV positive status among all reported tuberculosis cases, including those not tested

V. Completion of Therapy

Directly observed therapy (DOT) is the standard of care for administering TB medications. In DOT, health care workers observe the patient take his/her medications to ensure compliance. Due to the length of time to complete treatment for TB, 2004 data are the most recent finalized data available. In 2004, 226 of 262 (86%) cases who were started on treatment had either DOT or a combination of DOT and self-administered treatment (Table 6).

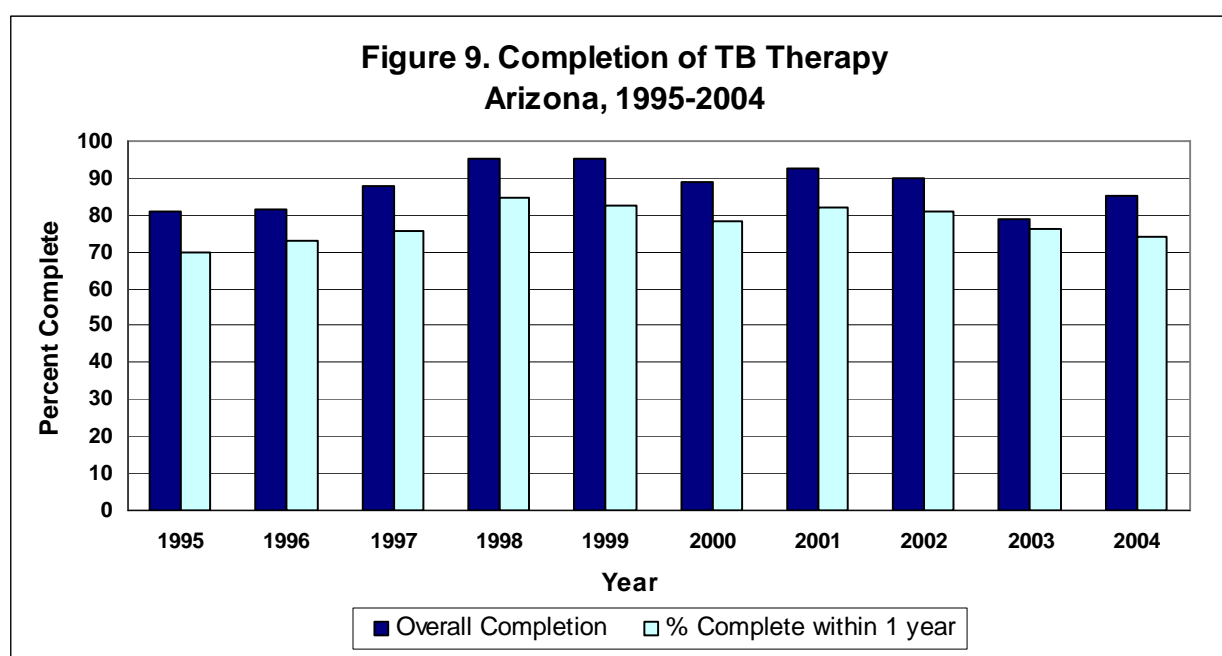
Table 6. Use of Directly Observed Therapy (DOT), Arizona, 2000-2004

	2000		2001		2002 ^a		2003		2004	
	No.	%	No.	%	No.	%	No.	%	No.	%
DOT	157	(64)	186	(67)	175	(70)	210	(74)	195	(74)
Both DOT and Self-Administered	40	(16)	40	(14)	34	(14)	24	(9)	31	(12)
Self-Administered Only	50	(20)	51	(18)	40	(16)	31	(11)	18	(7)
Unknown	0	(0)	1	(0)	1	(0)	1	(0)	4	(2)
Not Available	0	(0)	1	(0)	1	(0)	18	(6)	14	(5)
Total^b	247	(100)	279	(100)	251	(100)	284	(100)	262	(100)

^aCompletion data for 2002 is preliminary

^bIncludes persons alive at diagnosis with an initial drug regimen of one or more drugs

Arizona TB programs strive to achieve the CDC's goal of completion of therapy within one year for 90% of active TB cases. In 2004, 74% of cases completed treatment within one year and 85% of cases completed therapy overall (Figure 9). Completion of therapy within one year was 64% among inmates, 81% among homeless cases, and 85% overall. These highlight the challenges to ensure completion of therapy among inmates and also the successes with the homeless persons with TB in Maricopa County. State and local programs are working to improve completion of therapy performance.



VI. Drug Susceptibility

Initial drug susceptibility testing was obtained on 208 of 229 (91%) culture-positive TB cases in Arizona in 2006. INH resistance occurred among 18 of 208 (8.7%) culture confirmed cases. Foreign-born individuals accounted for 65% of the drug resistant cases. Multi-drug resistant TB (MDR TB) is TB that is resistant to at least two of the first line anti-TB drugs; isoniazid and rifampin. Three multi-drug resistant cases were identified in 2006. All multi-drug resistant cases since 2000 occurred among foreign-born persons (Table 7).

Table 7. Tuberculosis Cases Resistant to INH and Other Anti-TB Drugs, Arizona, 2000–2006												
Year	Cases	Culture Confirmed	Drug Sensitivity Testing		INH Resistant ^a		MDR ^b		Other Resistance ^c		Total Resistance ^d	
			No.	(%)	No.	(%)	No.	(%)	No.	(%)	No.	(%)
2000	261	228	221	(96.9)	17	(7.7)	3	(1.4)	19	(8.6)	36	(16.3)
2001	289	228	226	(99.1)	12	(5.3)	3	(1.3)	18	(8.0)	30	(13.3)
2002	263	212	209	(98.6)	11	(5.3)	1	(0.5)	24	(11.5)	35	(16.7)
2003	295	228	227	(99.6)	14	(6.2)	2	(0.9)	19	(8.4)	33	(14.5)
2004	272	206	204	(99.0)	20	(9.8)	2	(1.0)	24	(11.8)	44	(21.6)
2005	281	207	177	(85.5)	22	(12.4)	1	(0.6)	20	(11.3)	42	(23.7)
2006	315	229	208	(90.8)	18	(8.7)	3	(1.4)	9	(4.3)	27	(13.0)

^aIsolates may also be resistant to other drugs, including rifampin, includes initial and final susceptibility result
^bResistant to at least isoniazid and rifampin, includes initial and final susceptibility results
^cOther patterns of drug resistance excluding INH resistance
^dIsolates with resistance to any first or second line TB drug

VII. Activities

A. International Referral and Case Management

The TBCP coordinates with international referral agencies to ensure continuity of care for individuals with TB or suspected of having TB who migrate to or from the United States. CureTB facilitates the referral process with health officials from Mexico. TBNet facilitates the referral process for all other countries. In 2006, approximately 59 individuals were referred to CureTB or TBNet. Final treatment outcome is still unavailable.

B. Class B1/B2 Referrals

Individuals immigrating to the United States are evaluated for TB as part of the admission process. An immigrant found to have active TB that is not infectious is classified as a Class B1. Those with a chest x-ray that suggests a history of TB disease that is not currently active are classified as Class B2. The state of residence for those that are suspected of having TB infection is notified of all class B1 and B2 individuals identified. These referrals are then forwarded to the appropriate county of jurisdiction so that further evaluation and treatment for infection may be pursued. In 2006, ADHS received 151 class B notifications that were forwarded to counties for follow up.

C. Border Health Activities

Meetings/Conferences

On March 1, 2006 the TBCP held a Binational Planning Meeting with the ADHS Office of Border Health, the Secretaría de Salud Pública de Sonora (SSPS) and the Director of

the Office of Border Health for Sonora. Discussed were issues related to how both states handle TB control, and ways in which to improve TB control along the border.

On June 8, 2006 ADHS hosted a teleconference to discuss TB issues between Arizona and the Secretaría de Salud Pública de Sonora, Sonora. Topics of discussion were how to help build TB laboratory capacity in Sonora, Arizona State Public Health Laboratory ongoing testing for tuberculosis of sputum samples from Sonora, the TB Binational Card, the Meet and Greet Program, multi-drug resistant TB patients, pediatric TB, and how to coordinate our two programs. Communication, coordination, legal, immigration, and public health issues were discussed. All agencies' roles were identified.

“Meet and Greet” Program

The goal of the Arizona “Meet and Greet” program is to ensure continuity of care for individuals being treated for TB who are being deported to Mexico. A “Meet and Greet” requires coordination between the ADHS TBCP, ADHS Office of Border Health, Sonora Health Officials, Immigration and Customs Enforcement (ICE), local health departments, and the correctional facility or detention center that is housing the individual. The Department successfully completed six “Meet and Greets” in 2006. A Meet and Greet Workshop on July 19, 2006, was hosted by ADHS to discuss and improve the Meet and Greet Protocol that had been developed between the states of Arizona and Sonora to arrange for continuity of care for Mexican nationals with TB who are deported by US Immigration and Customs Enforcement (ICE) through the port of Nogales. The agencies that were involved included the US Department of Immigration Health Services, ICE, US Quarantine Division, US Border Patrol, US Marshal Service, Border County Health Departments, County Jails, TBNet, Director of Disease Prevention and Control for SSPS, Epidemiologists for the Hospital General of Nogales, Mexican National Institute of Immigration, Mexican Consulate, and the ADHS Border Health Office.